ORIGINAL ARTICLE

Cognitive Performance in Treatment Naive Adults having Obsessive Compulsive Disorder – A Hospital Based Cross-Sectional Study

Aditya Singhal*, C Y Sudarshans**

ABSTRACT

Background: Obsessive-compulsive disorder (OCD) is a neuropsychiatric disorder occurring in childhood and early adulthood, characterized by obsessions and compulsions. Impaired cognitive functions are reported in adults having OCD. They could be biomarkers for vulnerability to OCD. There is lack of published Indian literature in this area. Hence, present study was planned to assess the range and severity of cognitive function deficits in OCD.

Aim: To assess the cognitive performance (Motor and Processing speed, Spatial Working Memory & Visuoconstructive Memory) in patients having OCD.

Methods: 50 patients having OCD aged between 18-45 years formed the sample. After obtaining informed consent & recording sociodemographic data, severity of OCD was assessed on Yale Brown Obsessive Compulsive Scale (Y-BOCS). Colour Word Interference Test (CWIT), Rey-Osterrieth Complex Figure Test (ROCF) and Trail Making Test A and B (TMT) were used to assess motor and processing speed, visuoconstructive memory and Spatial working memory respectively. Results were compared within the groups and with normative data. IBM SPSS version 22 for windows was used to analyze the data.

Conclusion: OCD is associated with deficits in cognitive performance wherein age, gender, education, and severity of OCD play a significant role.

Key words: Cognitive performance, Obsessive Compulsive Disorder, Treatment Naïve.

INTRODUCTION

Obsessive-compulsive disorder (OCD) is a neuropsychiatric disorder characterized by intrusive thoughts, images or impulses/urges and/or time-consuming repetitive behaviors, including repetitive mental acts, leading to significant functional impairment and distress[1]. OCD affects both genders and disables the entire lifespan. OCD generally presents in childhood and early adulthood. Lifetime prevalence of OCD is estimated to be 2.3% while 12-month prevalence is 1.2%[2].

Obsessive thoughts and compulsive behaviors may also be observed in the general healthy population. About 80% of the general healthy population may occasionally experience obsessive, unpleasant and unwarranted thoughts which are generally labeled as subclinical Obsessive Compulsive (OC) tendencies, however most people do not infer these thoughts as harmful or act on them[3].

The individuals having OCD interpret the obsessive thoughts differently from unaffected individuals. These thoughts are supposed to have a cause of recurrence as per the individual suffering from OCD who interpret them as detrimental/injurious and thus try to defy such thoughts[4,5].

OCD has similar nature, character and content as a normal obsession but these thoughts present for a longer duration, greater intensity and with high recurrence in OCD individuals and thus lead to higher distress and anxiety[4, 6, 7].

OCD is associated with wide range of cognitive function deficits. Such cognitive functions include motor & processing speed, spatial working memory and visuoconstructive tasks. Adults diagnosed as having OCD have been reported to show deficits in visuospatial abilities, executive functions, verbal memory, verbal fluency and attention[8].

*Resident, **Professor and HOD, Department of Psychiatry, JJM Medical College, Davangere, 577004, Karnataka
Work attributed to: Department of Psychiatry, J.J.M Medical College, Davangere.
Correspondence Author:
Dr. Aditya Singhal
Address: Department of Psychiatry, J.J.M Medical College, MCC B Block, Kuvempu Nagar, Davangere.
E-mail: adityasinghal27894@gmail.com
Mobile: +91-9741985107

METHODS

- **Source of data-** Patients diagnosed as having OCD according to DSM V criteria, in the age group of 18-45 years seeking treatment from OPDs of hospitals attached to a medical college in Karnataka formed the sample of the study.
- **Study period-** January 2021 to July 2022
- **Study design**- This was a hospital based cross sectional study.

– Patients who meet the inclusion criterion and did not get excluded were recruited to the study by consecutive sampling.

- **Inclusion Criteria**-

– Patients diagnosed as having OCD as per DSM- 5

– Age between 18-45 years

– Both genders.

– Minimum education upto 5th standard.

– All the patients who gave informed consent to participate in the study were included.

- **Exclusion Criteria-**

– Presence of psychiatric co morbidity other than mood syndromes secondary to OCD.

– Associated major medical illnesses.

– Alcohol and Substance use disorder.

– History of treatment for OCD.

- **Sample size**- 50
- **Assessment Tools**-

– Informed Consent Form.

– Self-designed Proforma to elicit Socio demographic data.

– Severity of OCD was assessed using Yale Brown Obsessive Compulsive Scale (Y-BOCS).

– Motor & Processing Speed was assessed using Color Word Interference Test (CWIT).

– Spatial Working Memory was tested by Trail Making Test.

– Visuoconstructive Memory by Rey Osterrieth Complex Figure Test (ROCF).

- **Statistical Analysis-**

Categorical data is represented in the form of frequency and percentage. Association of variables was assessed with Chi Square Test. Quantitative data is represented as Mean and Sd. Comparison was done with unpaired t Test. P value of <0.05 was considered statistically significant. ANOVA test and Mann-Whitney U test were also applied to see significance. IBM SPSS Version 22 for Windows was used for analyzing data.

RESULTS

Table I - Sociodemographic data of sample

Socio-demographic	Range	Group-A	Percent %
Age in years	18-27 years	21	42
	28-36 years	13	26
	37-45 years	16	32
Gender	Male	22	44
	Female	28	56
Education	Upto PUC	28	56
	Degree or diploma	22	44
Total	Each Category	50	100

The group had most people in the younger age group of 18-27 years (n=21, 42%). Females formed larger part of the sample (n=28, 56%). Most patients had studied upto PUC (n=28, 56%).

Table II - Y-BOCS severity

Severity of OCD on Y-BOCS	No. of cases	Percent (%)
Mild	0	0
Moderate	38	76
Moderate-severe	12	24
Severe	0	0

Patients were in moderate and moderate-severe range of Y-BOCS.

Table III - Age and cognitive function

Cognitive Functions	Age			ANOVA	
	18-27 (n=21)	28-36 (n=13)	37-45 (n=16)	P value	Significance
CWIT Word	20.7 ± 9.6	18.7 ± 5.57	24.7 ± 10.9	0.21	NS
CWIT Color	48.1 ± 9.9	23.5 ± 6.5	56.7 ± 19.5	0.246	NS
TMT-A	39.2 ±15.2	25.7 ±7.7	29.9 ± 11.9	P<0.003	HS
TMT-B	85.0 ± 33.2	57.1 ± 15.1	60.8 ± 28.4	P<0.005	HS
ROCF AT REGISTRAT	34.5 ± 0.98	35.1 ± 1.3	34.6 ± 1.45	0.386	NS
ROCF at 3 MIN	17.6 ± 4.99	18.7 ± 6.2	19.0 ± 5.5	0.73	NS
ROCF at 30 MIN	16.7 ± 4.7	17.4 ± 6.1	16.1 ± 5.8	0.82	NS
NS = NOT SIG, HS = HIGHLY SIG,					

On comparing cognitive functions of patients with the age groups, highly significant correlation was observed on Trial Making Test A (39.2 ±15.2 sec) and B (85.0 ±33.2 sec) with poorer performance observed in the younger age group (18-27 years) compared to other two groups. No significant differences on other test performance were observed with age.

Table IV - Gender and cognitive function

Cognitive Functions	Male (n=22)		Female (n=28)		Unpaired t Test	
	Mean	Std. Deviation	Mean	Std. Deviation	P value	Significance
CWIT Word	19.68	5.79	22.86	11.25	0.234	NS
CWIT Color	58.98	12.54	44.93	16.32	P<0.002	HS
TMT-A	31.79	14.42	32.30	13.57	0.9	NS
TMT-B	75.85	25.05	65.40	33.64	0.23	NS
ROCF AT REGISTRATION	34.45	1.18	34.86	1.27	0.257	NS
ROCF at 3 MIN	17.07	4.61	19.36	5.85	0.139	NS
ROCF at 30 MIN	15.82	4.52	17.34	5.97	0.327	NS
NS = NOT SIG, HS = HIGHLY SIG,						

On CWIT test colour naming subtype females took significantly lesser time than males indicating better performance.

Table V - Education and cognitive Function

Cognitive Functions	≤ PUC (n=28)		Degree (n=22)		Unpaired t Test	
	Mean	Std. Deviation	Mean	Std. Deviation	P value	Significance
CWIT Word	24.42	10.27	17.70	6.33	P<0.01	S
CWIT Color	56.49	14.82	51.36	37.01	0.506	NS
TMT-A	33.17	14.09	30.68	13.64	0.545	NS
TMT-B	71.92	30.63	67.55	30.49	0.618	NS
ROCF AT REGISTRATION	34.46	1.40	34.95	0.95	0.166	NS
ROCF at 3 MIN	19.00	5.10	17.52	5.81	0.434	NS
ROCF at 30 MIN	16.64	5.45	16.70	5.44	0.968	NS
NS = NOT SIG, S = SIG,						

On CWIT test word naming subtype more educated sample took significantly lesser time than less educated indicating better performance.

Table VI - Y-BOCS severity and Cognitive Performance

Table VIa CWIT - Time and Cognitive performance

TEST	YBOCS – SEVERITY				Mann-Whitney U test	
	Moderate (n=38)		Moderate-severe (n=12)			
	Mean	Std. Deviation	Mean	Std. Deviation	P value	Significance
CWIT word naming (seconds)	20.57	8.44	24.28	11.61	0.427	Not Sig
CWIT colour naming (seconds)	49.91	16.96	54.91	13.64	0.307	Not Sig

Table VIb: CWIT - Mistakes and Cognitive performance

Test	Mistakes	YBOCS – SEVERITY				Chi Square test
		Moderate (n=38)		Moderate-severe (n=12)		
		Count	%	Count	%	
CWIT word naming (seconds)	No	35	92	9	75	0.112, Not Sig
	Yes	3	8	3	25	
CWIT colour naming (seconds)	No	11	29	2	17	0.402, Not Sig
	Yes	27	71	10	83	

Table VIc - Performance on ROCF in Group A

TEST	YBOCS – SEVERITY				Independent t Test	
	Moderate (n=38)		Moderate-severe (n=12)			
	Mean	Std. Deviation	Mean	Std. Deviation	P value	Significance
ROCF Registration	34.76	1.22	34.42	1.31	0.403	Not Sig
ROCF 3 min	18.16	5.44	18.96	5.51	0.66	Not Sig
ROCF 30 min	16.59	5.45	16.92	5.41	0.86	Not Sig

Table VId: TMT- Time and Cognitive performance of Group A

TEST	YBOCS – SEVERITY				Mann-Whitney U test	
	Moderate (n=38)		Moderate-severe (n=12)			
	Mean	Std. Deviation	Mean	Std. Deviation	P value	Significance
TMT-A (seconds)	31.72	13.88	33.20	14.12	0.838	Not Sig
TMT-B (seconds)	67.40	27.35	78.23	38.53	0.633	Not Sig

Table VIe: TMT- Mistakes and Cognitive performance of Group A

Test	Mistakes	YBOCS – SEVERITY				Chi Square test
		Moderate (n=38)		Moderate-severe (n=12)		
		Count	%	Count	%	
TMT-A (seconds)	No	32	84	10	83	0.711, Not Sig
	Yes	6	16	2	17	
TMT-B (seconds)	No	11	29	3	25	0.863, Not Sig
	Yes	27	71	9	75	

There was no significant association between severity of OCD as measured by Y-BOCS and performance on various cognitive tasks.

DISCUSSION

This study was aimed to evaluate the cognitive functions of drug naïve patients having OCD. Cognitive functions were compared with sociodemographic profile and Y-BOCS severity.

In the current study younger subjects (18-27 years) had significantly poor performance on TMT suggesting impairment in spatial working memory. This is in contrast to the study by Tombaugh et al (2004) on normative data about trend of performance in different age groups wherein younger sample performed better on Trail making test with linear correlation between age and performance.[9] In the present study patients aged between 28-36yrs performed better than those aged between 36-45 years similar to study conducted on normal population by Tombaugh et al.[9] In the present study age was not significantly associated with motor & processing speed. According to Zimmermann when age alone was considered younger group performed better than the older group.[10] In the present study there was no association between age and visuospatial memory. However according to Gallagher younger people performed better than older people.[11]

Females performed better on motor and processing speed (CWIT colour naming). This result is in accordance to previous study on normative data trend on CWIT test conducted by Strikland et al (1997) wherein women demonstrated significantly better performance than men on the test scores.[12] No significant difference was observed in Visuoconstructive memory between the two genders. However a study by Gallagher reported men performed better than women on visuoconstructive memory tasks.[11]

More educated subjects performed better on motor and processing speed. This is in accordance to previous study by Zimmermann et al (2015) who reported that normal people who were less educated exhibited poorer performance on CWIT when compared to those who are more educated.[10]

No difference on motor & processing speed, spatial working memory and visuoconstructive memory was observed with Y-BOCS severity in group A. Study by Choi et al (2003) reported similar inference with no significant difference in performance observed on cognitive function compared to Y-BOCS severity score.[13] Study by Krishna et al (2011) reported no association between OCD severity and spatial working memory.[14] Rao et al (2008) also reported no association between severity of OCD and visuospatial memory.[15] On the contrary a meta-analysis by Abramovitch A et al (2015) reported poorer performance on TMT (A & B) and ROCF test with respect to Y-BOCS severity suggesting poor spatial working memory and visuoconstructive memory in severe cases of OCD.[16]

LIMITATIONS

1) Formal IQ assessment was not done and education status was used as a indicator of normal IQ levels.
2) Sample size was relatively small as only drug naïve patients were included.
3) Participants had difficulty in comprehending instructions of some tests even after meeting the criteria for minimum education for entry into the study.
4) A healthy control group was not included for comparison of cognitive performance.
5) Cognitive performance was assessed in a single session which might have resulted in mental fatigue affecting the performance.

DIRECTIONS FOR FUTURE RESEARCH

1) Applying neuroimaging studies along with the performance tests to assess the brain areas involved in a particular functioning.
2) Longitudinal assessment of cognitive performance after initiating the treatment for OCD.
3) Comparing the performance on various domains with a matched healthy control group to assess Cognitive performance.
4) Cognitive functions not assessed in the present study like attention and cognitive flexibility can also be included for assessment in future.

ACKNOWLEDGEMENT

We are really grateful to the department and staff of department of psychiatry, JJM Medical College for helping in completion of this research work.

REFERENCES

1. Lochner C, Chamberlain SR, Kidd M, Taljaard L, Fineberg NA, Robbins TW, Stein DJ. The effects of acute serotonin challenge on executive planning in patients with obsessive–compulsive disorder (OCD), their first-degree relatives, and healthy controls. Psychopharmacology. 2020 Oct;237(10):3117-23.
2. Fornaro M, Gabrielli F, Albano C, Fornaro S, Rizzato S, Mattei C, Solano P, Vinciguerra V, Fornaro P. Obsessive-compulsive disorder and related disorders: a comprehensive survey. Annals of General Psychiatry. 2009 Dec;8(1):1-3.
3. Ruscio AM, Stein DJ, Chiu WT, Kessler RC. The epidemiology of obsessive-compulsive disorder in the National Comorbidity Survey Replication. Molecular psychiatry. 2010 Jan;15(1):53-63.
4. Johansen T, Dittrich WH. Cognitive performance in a subclinical obsessive-compulsive sample 1: Cognitive functions. Psychiatry journal. 2013 Oct;2013.
5. Rachman S, de Silva P. Abnormal and normal obsessions. Behaviour research and therapy. 1978 Jan 1;16(4):233-48.
6. Salkovskis PM, Harrison J. Abnormal and normal obsessions—a replication. Behaviour research and therapy. 1984 Jan 1;22(5):549-52.
7. Rachman S. A cognitive theory of obsessions: Elaborations. Behaviour research and therapy. 1998 Apr 1;36(4):385-401.
8. Shin NY, Lee TY, Kim E, Kwon JS. Cognitive functioning in obsessive-compulsive disorder: a meta-analysis. Psychological medicine. 2014 Apr; 44(6):1121-30.
9. Tombaugh TN. Trail Making Test A and B: normative data stratified by age and education. Archives of clinical neuropsychology. 2004 Mar 1;19(2):203-14.
10. Zimmermann N, Cardoso CD, Trentini CM, Grassi-Oliveira R, Fonseca RP. Brazilian preliminary norms and investigation of age and education effects on the Modified Wisconsin Card Sorting Test, Stroop Color and Word test and Digit Span test in adults. Dementia & Neuropsychologia. 2015 Apr;9:120-7.
11. Gallagher C, Burke T. Age, gender and IQ effects on the Rey-Osterrieth Complex Figure Test. Br J Clin Psychol. 2007 Mar;46(Pt 1):35-45.
12. Strickland TL, D'elia LF, James R, Stein R. Stroop color-word performance of African Americans. The Clinical Neuropsychologist. 1997 Feb 1;11(1):87-90.
13. Choi JS, Kang DH, Kim JJ, Ha TH, Lee JM, Youn T, Kim IY, Kim SI, Kwon JS. Left anterior subregion of orbitofrontal cortex volume reduction and impaired organizational strategies in obsessive-compulsive disorder. Journal of Psychiatric Research. 2004 Mar 1;38(2):193-9.
14. Krishna R, Udupa S, George CM, Kumar KJ, Viswanath B, Kandavel T, Venkatasubramanian G, Reddy YJ. Neuropsychological performance in OCD: a study in medication-naïve patients. Progress in Neuro-Psychopharmacology and Biological Psychiatry. 2011 Dec 1;35(8):1969-76.
15. Rao NP, Reddy YJ, Kumar KJ, Kandavel T, Chandrashekar CR. Are neuropsychological deficits trait markers in OCD?. Progress in Neuro-Psychopharmacology and Biological Psychiatry. 2008 Aug 1;32(6):1574-9.
16. Abramovitch A, Abramowitz JS, Mittelman A, Stark A, Ramsey K, Geller DA. Research Review: Neuropsychological test performance in pediatric obsessive–compulsive disorder–a meta- analysis. Journal of Child Psychology and Psychiatry. 2015 Aug;56(8):837-47.